

High-Current Power Distribution Alarm Panel

Power :: 009-6212-2100

User Manual



Applies to : 009-6212-2100

High-Current Power Distribution Alarm Panel

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1. System Description

1.1 General Description

The Telect dual-feed High-Current Power Distribution Alarm Panel (HCPDAP, Model 009-6212-2100) accepts two input power circuits of the same polarity up to 200 amps.

It distributes up to 200 amps load amperage per side (400 amps total). The distribution panel holds six “bullet terminal” front-access circuit breakers per side (12 total). Each breaker position is capable of breakers rated up to 100 amps.

Acceptable voltages are +20 to +30 VDC, or –20 to –60 VDC.

Features include:

- Dual-feed power inputs (Input A and Input B)
- Accepts circuit breakers rated up to 100 amps (see “Accessories” on Page 8-1)
- Breaker alarm with single visual and single remote dry contact indicator
- Visual A and B input power alarms with single remote dry contact indicator
- Replaceable alarm card
- Total rear access (TRA) for input and output power
- 009-6212-2100 is Listed by UL for USA and Canada
- 009-6212-2100 is NEBS and CE certified

1.2 Electrical Specifications

Electrical Specifications	
Operating voltages	–20 to –60 VDC, +20 to +30 VDC
Maximum input interruption device rating	250A
Maximum continuous input load rating	200A
Maximum output interruption device rating	100A per circuit breaker
Maximum continuous output load rating	100A per circuit breaker
Alarm contact ratings, continuous	2A at 30 VDC 0.6A at 60 VDC 1A at 120 VAC
Alarm board power ratings (maximum power draw)	@20V: 32 mA (0.64 W) @24V: 40 mA (0.96 W) @27V: 44 mA (1.19 W) @30V: 46 mA (1.38 W) @42V: 54 mA (2.27 W) @48V: 58 mA (2.78 W) @56V: 63 mA (3.53 W) @60V: 66 mA (3.96 W)
Max. operating temperature at max. load ratings	55° C (131° F)
Min. operating temperature at max. load ratings	–10° C (14° F)
Ambient operating temp. at half-load	60° C (140° F)
Max. surface temperature of breakers at 26°C (79°F) ambient	37° C (99° F)
Max. panel heat dissipation at full load	20W per side at 9600W (200A x 48V) per side
Percentage of full load heat dissipation	Less than 0.5%

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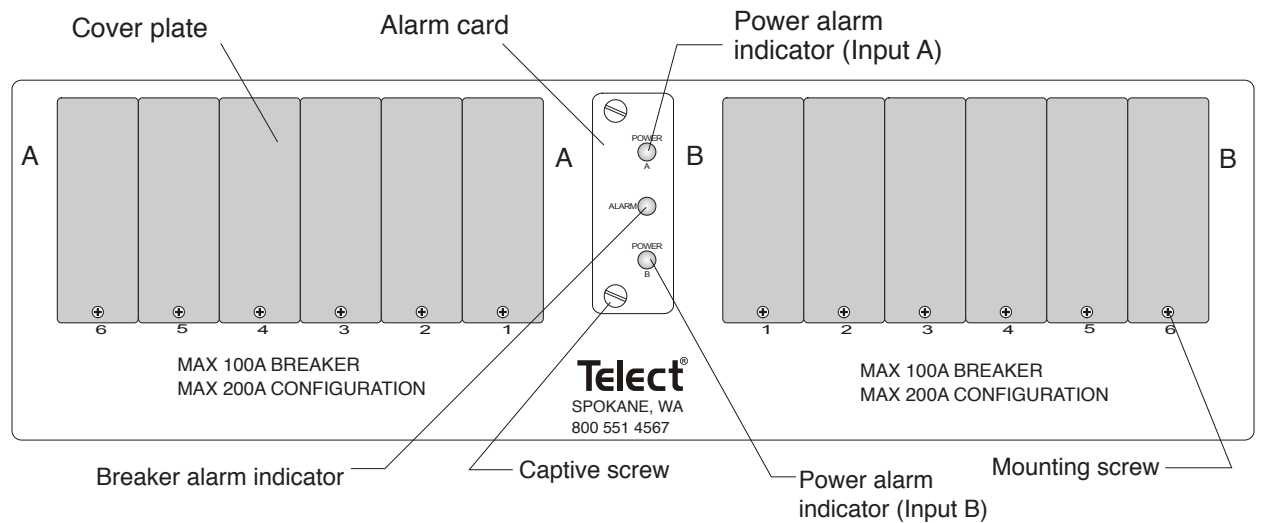
1.3 Mechanical Specifications

Mechanical Specifications		
Dimensions, with brackets	Width: Height: Depth:	19.00 in. (48.26 cm) 4.97 in. (12.63 cm) 7.99 in. (20.31 cm)
Weight, without breakers	19.065 lb (8.648 kg)	
Weight, shipping	22 lb (10 kg)	
Mounting capability: (ETSI brackets sold separately)	EIA: WECO: ETSI:	19-inch (48.26 cm) 23-inch (58.42 cm) Kits sold separately. See "Accessories" on page 30).
Ground terminals	Quantity: Stud size: Nut: Socket size: Cable: Lugs: Size: Center to center: Maximum torque:	2 1/4 inch 1/4-20 HEX 7/16 inch (12 mm) Up to 1 AWG (depending on size of input interruption device) 2-hole compression lug Same as cable up to 1 AWG 5/8 inch 25 in-lb (2.83 N-m)
Input terminals	Quantity: Stud size: Nut: Socket size: Cable: Lugs: Size: Center to center: Maximum torque:	4: 2 BATT, 2 RTN 5/16 inch 5/16-18 KEPS 1/2 inch (13 mm) #6 to 4/0 AWG (depending on size of input interruption device) 2-hole compression lug Same as cable up to 4/0 AWG; 1" width MAX. 1 inch 40 in-lb (4.52 N-m)
Output terminals	Quantity: Stud size: Nut: Socket size: Cable: Lugs: Size: Center to center: Maximum torque:	24: 12 BATT, 12 RTN #10 #10-32 KEPS 3/8 inch (10 mm) #6 to 2 AWG (depending on size of output breaker) 2-hole compression lug Same as cable up to 6 AWG; 0.6" width 5/8 inch 20 in-lb (2.27 N-m)
Alarm terminals	Quantity: Stud size: Cable:	6 #3-48 18-22 AWG

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1.4 Physical Attributes



Dimensions (L x W x D):
17.25 x 5 x 8 inches
[43.82 x 12.7 x 20.32 cm]

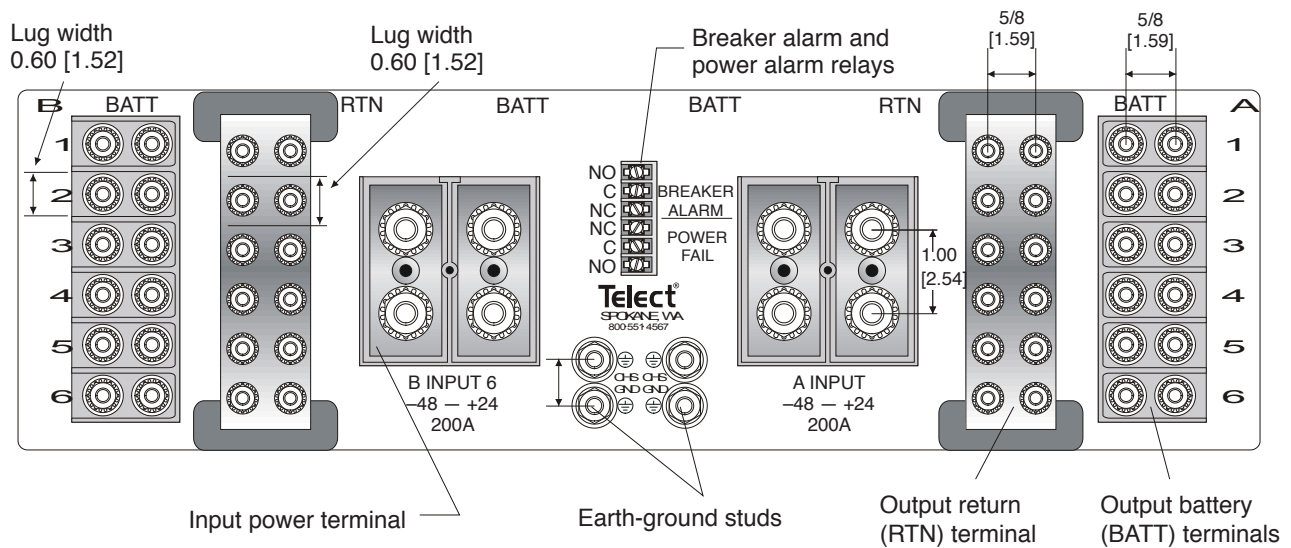


Figure 1 - Attributes and Dimensions

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1.5 Schematic diagram

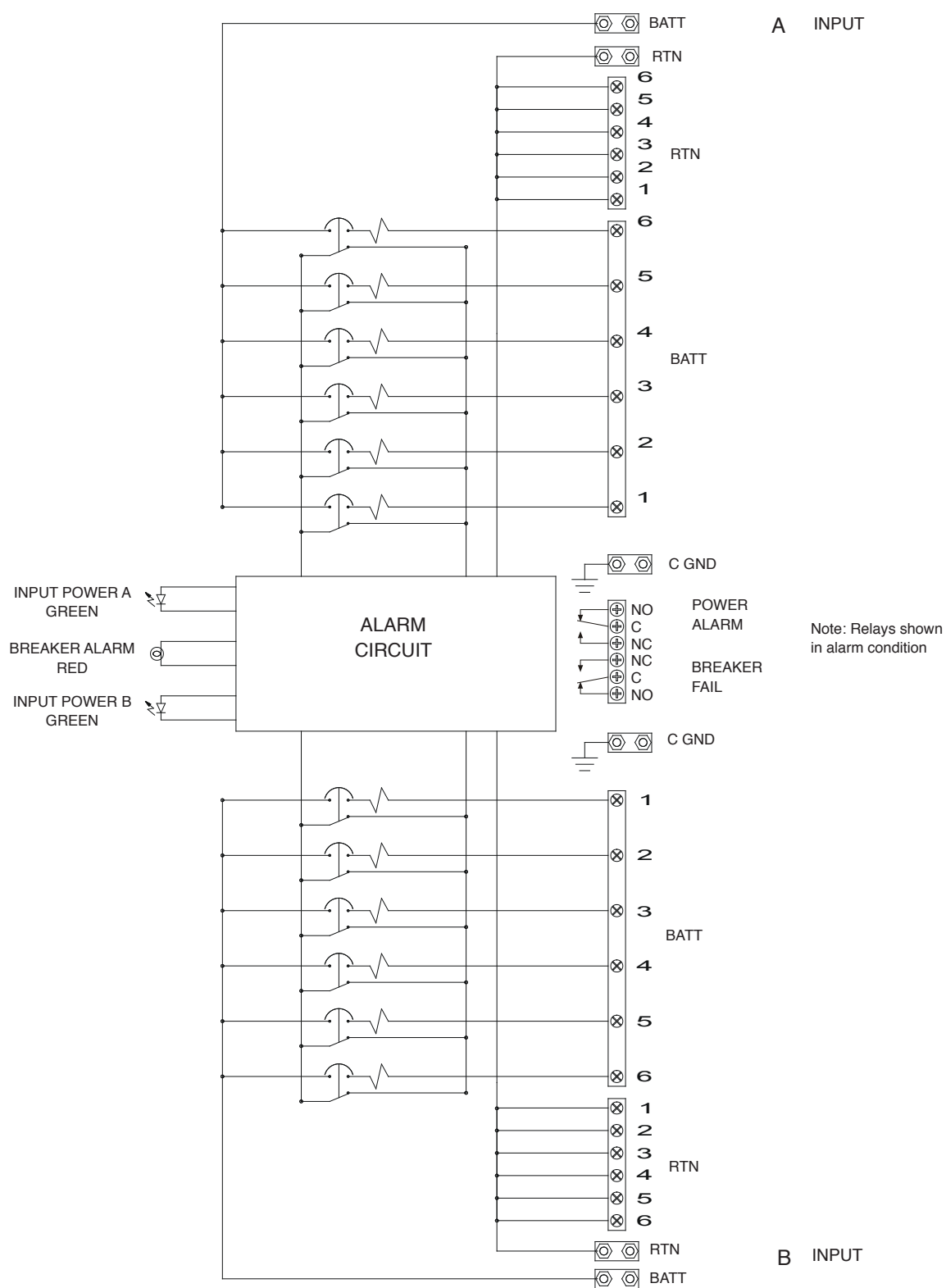


Figure 2 - Schematic

High-Current Power Distribution Alarm Panel

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2. Before You Begin

2.1 Document Authority

Your operating company's approved installation procedures take priority over this manual. Modify these instructions accordingly.

This manual describes a best-practice method of DC distribution breaker panel installation and operation. It does not attempt to specify a standard for engineering design and installation.

2.2 Tools

The following tools and terminals are needed to install this device:

- No. 1 and No. 2 Phillips head screwdrivers
- No. 2 flathead screwdriver
- 7/16-inch (12 mm), 1/2-inch (12 mm), and 3/8-inch (10 mm) torque wrenches or sockets
- Cable cutter and insulation stripping tool
- Approved wire-terminal crimping tools
- Lacing cord or nylon cable ties
- Voltmeter
- Ohmmeter

2.3 Cables and Cabling Hardware

The following cables and terminals are needed to install this device:

- Ground cable(s)
- 2 two-hole compression lugs for ground cable(s)
- Two BATT and two RTN input power cables
- 4 two-hole compression lugs for input power cables
- BATT and RTN output cables, as needed
- 2 two-hole compression lugs per output cables.
- 18 AWG to 26 AWG standard telecom hookup wire to connect remote alarms

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2.4 Safety Warnings

2.4.1 Clothing and Work Environment



CAUTION

Do not work alone under potentially hazardous conditions.

Wear safety glasses. Do not wear loose clothing that may get caught in equipment. Roll up your sleeves, and remove or fasten neckties and scarves. Remove jewelry such as rings, necklaces, and watches before working on this equipment.

Eliminate potential hazards in your work area, such as wet floors, ungrounded power cables, cluttered aisles, etc. Keep tools away from walkways, aisles, or places where people could trip over them. Provide safety cones when saying equipment or cables on the floor.

Always secure loose cables to the cable racks.

2.4.2 Electrical Safety



WARNING

Only trained and qualified personnel should install, service, or replace this device.

Read all installation instructions before you connect this device to a power source.

Disconnect all power before you install or remove this device, or before you work near a power supply. Never assume that circuit power is off-always verify.

This equipment must be grounded. Verify that it is connected to earth ground before applying power. Never operate this equipment in the absence of an earth ground. Contact an authorized electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.

A readily accessible interruption device (breaker or fuse) must be incorporated in the fixed input wiring.

Do not work on the system or handle cables during periods of lightning activity.

Locate the emergency power-OFF switch in the room in which you are working in order to quickly shut down power if an electrical accident occurs.

2.4.3 In Case of Accident

Should you witness an electrical accident, do the following:

1. Turn OFF power to the system.
2. When possible, stay with the victim and send another person to get medical assistance. Otherwise, determine the condition of the victim, then call for help.
3. Determine if the victim needs CPR. If qualified, take appropriate action.

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3. Rack-Mounting

3.1 Planning Rack Location and Space

The distribution panel's mounting brackets provide mounting access to the following racks:

- 19-inch (48.26 cm) EIA racks
- 23-inch (58.42 cm) WECO racks.

Telect recommends the following mounting practices:

- Mount the panel to the upper-most rack position.
- Allow one rack unit of empty space (1.75 inches or 4.45 cm) below the panel to provide adequate ventilation.

3.2 Rack-Mounting and Labeling Procedure



WARNING

Do not supply power to the equipment rack or the distribution panel until the panel is securely mounted and grounded.

Note that the distribution panel has three sets of mounting points—flush, three-inch offset, and four-inch offset. The panel ships with brackets positioned for flush mounting to a 19" or 23" rack.

1. Decide if the distribution panel is to be mounted flush with the equipment rack, or if it is to be offset (extended) from the rack.
2. If needed, move the mounting brackets to the desired position on the product's chassis. Torque the screws to 25 in-lb (2.83 N•m).
3. Align the holes in the mounting brackets to the holes on the equipment rack. Then mount the distribution panel to the equipment rack with the four mounting screws and star washers.
4. Torque the screws to 35 in-lb (4.29 N•m).
5. Label the front and the rear of the panel according to the labeling conventions specified in Telect 117995 Wire Sizing and Labels.

See the illustration on the following page for rack-mounting procedure.

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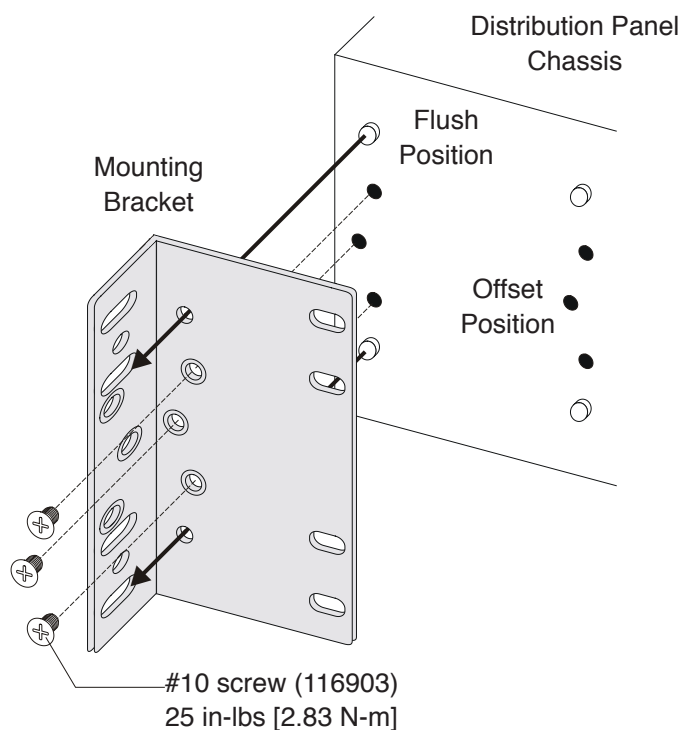


Figure 3 - Mounting bracket

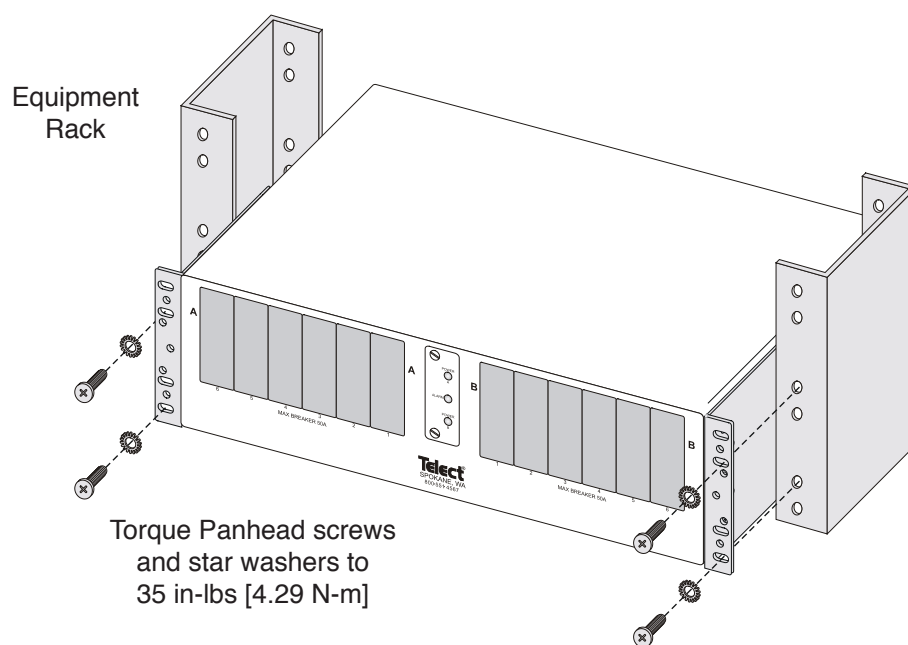


Figure 4 - Rack-mounting bracket

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4. Connecting Cables

4.1 Cabling Guidelines

NOTE: Cables and hook-up wires must conform to your operating company's installation guidelines, as well as, national, regional and local electrical codes.

Follow these guidelines when building cables:

- Account for the worst-case situation of your application when selecting materials for cable and hook-up wire installations.
- Use properly rated cables and compression lugs approved by a nationally recognized test laboratory (NRTL) for all power cables and ground cables.
- Crimp all terminals with tooling approved by the terminal's manufacturer.
- Cover power cable compression lug barrels with UL94V0 rated heat shrink tube.
- Mark each cable end with its opposite termination destination and its polarity.
- Secure cables to the equipment rack to prevent loose, falling cables.
- At the BDFB and other equipment, attach power cables to the cable management system (CMS) with lacing cord or nylon cable ties before terminating them.
- When installing power cables, do not strain or twist the cables. The cables must move smoothly and easily into place.
- Install cables in a neat, uniform manner.

In most cases, your operating company's installation procedures will provide you with the necessary guidelines and wire charts necessary to determine the properly rated wires, cables, and compression lugs to perform this installation. If this information is not provided, consult your engineer, or see Telect 117995 Wire Sizing and Labels.

4.2 Cable Conventions

4.2.1 Polarity

Use the following conventions when preparing cables:

Term:	Designation:
BATT	Battery (BATT) refers to the power distribution source's circuit-interrupt (fuse/breaker) polarity.
RTN	Return (RTN) refers to the plant polarity referenced to earth-ground.

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5. Installing Breakers

5.1 General Guidelines for Installing Breakers

Operating companies have guidelines to determine proper circuit breaker ratings. Telect recommends you follow those guidelines where applicable.

Also follow the guidelines below when installing circuit breakers in the High Current Power Distribution Alarm Panel (HCPDAP). These practices prevent injury to personnel, ensure proper distribution panel operation, and prevent damage to the distribution panel and connected equipment.

- Install all output cabling and verify output cable polarities before permanently activating breakers.
- Always select a properly rated breaker for the circuit. Refer to your job specifications for maximum output load ratings and corresponding circuit breaker ratings, or see “5.3 Calculating Circuit Breaker Ratings” on Page 5-2.



CAUTION

The maximum rated load current for each circuit breaker position must not exceed 100 amps.

The combined current for each output branch circuit (total A output or total B output) must not exceed 200 amps per side.

- Keep cover plates over all vacant breaker positions at all times during installation.
- Review the HCPDAP's power requirements and corresponding cable gauges any time the you add or remove equipment from the panel. This practice confirms proper breaker ratings for the modified circuits, and it ensures that the panel load capacity is not exceeded.
- Read the installation guide provided with the circuit breaker.
- When using high-current breakers, try to leave at least one empty breaker position between breakers.

5.2 HCPDAP Circuit Breaker Capacity

The HCPDAP maximum circuit breaker capacity is 200 amps per side (A and B) for a total of 400 amps. Do not exceed a rating of 100 amps for any breaker position in the panel.

The sum of the circuit breaker ratings on either side (A or B) of the HCPDAP must not exceed that side's maximum rated input current.

Example:

If A and B input current is rated at 200 amps, then the sum of the panel's circuit breaker ratings must be less than or equal to 200 amps:

$$A-1 + A-2 + \dots + A-6 \leq 200 \text{ amps}$$

$$B-1 + B-2 + \dots + B-6 \leq 200 \text{ amps}$$

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4.2.2 Color Conventions

When using colored cables, use the following color conventions:

Color:	Designation:
RED	Battery (BATT) polarity A
BLUE	Battery (BATT) polarity B
BLACK	Return (RTN)
GREEN	Earth-ground

4.3 Power System Diagram

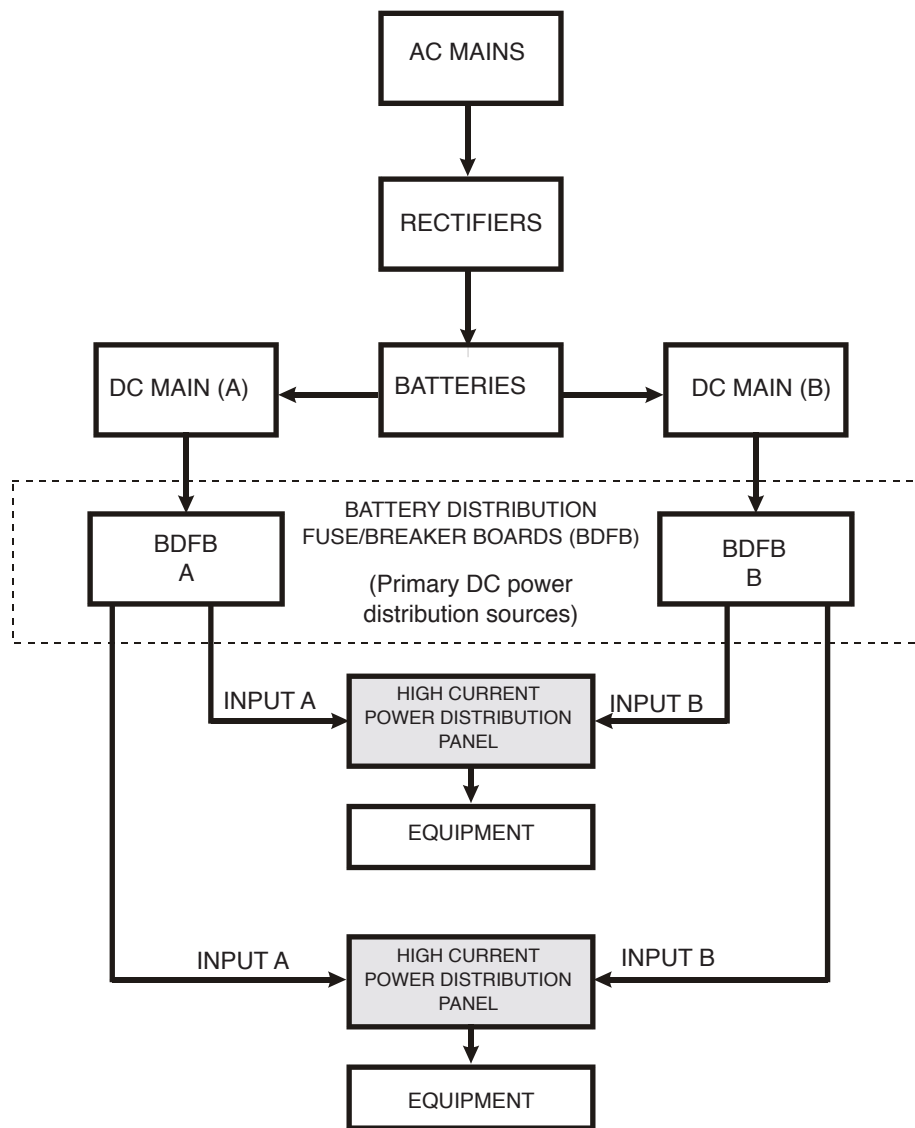


Figure 5 - Power System

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4.4 Connecting Ground Cables

NOTE: The RTN and BATT terminals are completely isolated from the chassis ground. Earth-ground reference is determined by plant polarity.

1. Determine the proper ground cable configuration by the BDFB output amperage that feeds the HCPDAP input power terminals. Then, construct the ground cable(s). Use properly rated cables with two-hole compression lugs. For assistance, refer to your operating company's installation procedures, or see Telect 117995 Wire Sizing and Labels.
2. Locate the earth-ground studs on the HCPDAP backplane (see drawing on next page).
3. Recommended: For improved surface contact, remove the paint from the HCPDAP chassis that surrounds the earth-ground studs. Use appropriate paint removing tools, such as a wire brush or a Dremel® tool.
4. Clean the contact areas of the compression lugs and the mating surface of the HCPDAP chassis. Use a coarse non-metallic cleaning pad.
5. Secure the compression lug to the grounding studs with the 1/4–20 HEX nuts provided. Torque the nuts to 25 in-lb (2.84 N•m) with a 7/16–inch (12 mm) socket.

NOTE: If required by the operating company's installation procedures, use anti-oxidant compound between the cable compression lugs and the corresponding grounding surfaces, such as the chassis, equipment rack, ground relay rack, or ground bus.

6. Attach the ground cable(s) to the ground relay rack or ground bus according to the operating company's installation procedures.

4.5 Connecting Input Power Cables

Input power cables connect the HCPDAP to the BDFB. The cables must support 125% of the rated continuous load current of the equipment powered by the HCPDAP breakers, up to 200 amps per side.



WARNING

Before connecting input power cables, shut down BDFB Power to the circuits feeding the HCPDAP. Remove or lock out the BDFB circuit breakers, or verify that the BDFB fuse positions are open.

1. Construct BATT and RTN cables for both A and B input power circuits. Use properly rated cables and two-hole compression lugs. Insulate the lug barrels with UL 94V-0 rated heat shrink tubing.

For assistance, refer to the operating company's installation procedures, or see Telect 117995 Wire Sizing and Labels.

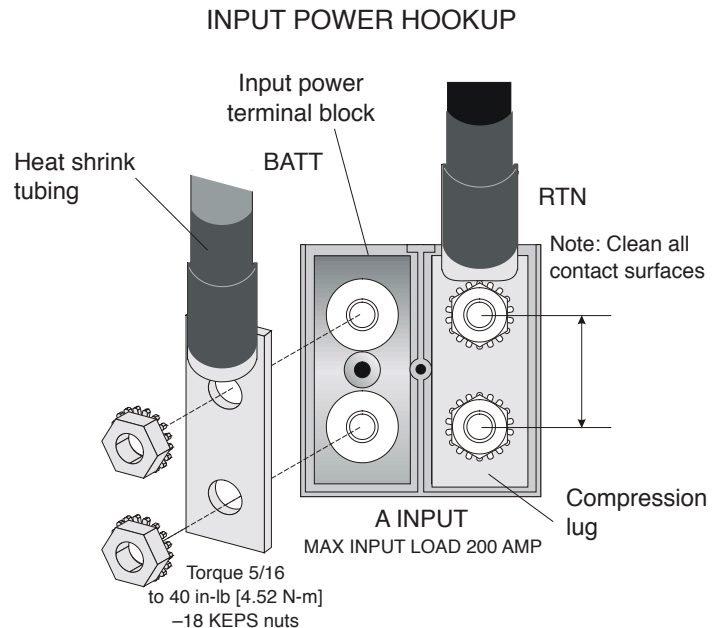
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2. Locate the two input power terminals (Input A and Input B) on the HCDPAP backplane. Remove the black plastic terminal covers.
3. Clean the contact areas of the compression lugs and the input power terminal. Use a coarse non-metallic cleaning pad.

NOTE: If required by the operating company's installation procedures, use anti-oxidant compound between the cable compression lugs and the input BATT and RTN terminals.

4. Secure the BATT and RTN cables to the input power terminal blocks with the 5/16–18 KEPS nuts, as shown. Torque the nuts to 40 in-lb (4.52 N·m) with a 1/2-inch (13 mm) socket.
5. Reinstall the terminal block covers.



4.6 Connecting to the Power Bays

Figure 6 - Input Power Hookup



WARNING

Use extreme caution! The DC power circuits surrounding the cable termination points are live! Refer to the operating company's installation procedures for connections to power bays. You may be required to have power personnel on site when making these connections.

The power bays come in two basic configurations:

- The fuse/breaker battery (BATT) terminations and the return (RTN) bus are contained within the same bay.
- The fuse/breaker battery (BATT) terminations are contained within the bay, but the return (RTN) bus is located outside the bay

NOTE: The 48 VDC BDFB must be electrically isolated from the AC power source, and must be reliably connected to earth-ground.

1. Before making cable connections, remove the BDFB fuse/breaker for this circuit, and remove any signal indicator fuses, when present.
2. Use a DC voltmeter to verify that no voltage is present at the BDFB output terminals.
3. Clean the contact areas of the cable compression lugs and the power bay output terminals. Use a coarse non-metallic cleaning pad.
4. Carefully secure the BATT cables to the BDFB output terminals in a neat, uniform manner, according to the operating company's installation procedures. Provide only one BATT cable termination per fuse/breaker position. Do not combine separate loads on the same fuse/breaker.

NOTES:

- If required by the operating company's installation procedures, use anti-oxidant compound between the cable compression lugs and the BDFB output BATT and RTN terminals.
- Do not connect the returns to any bus bars marked for CO grounds.

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5. Carefully secure the RTN cables to the BDFB return bus in a neat, uniform manner, according to the operating company's installation procedures.

For two-cable arrangements, it is normally acceptable to connect the A and B return (RTN) cable lugs to the return bus bar in a back-to-back arrangement so that they sandwich the bus bar, as shown.

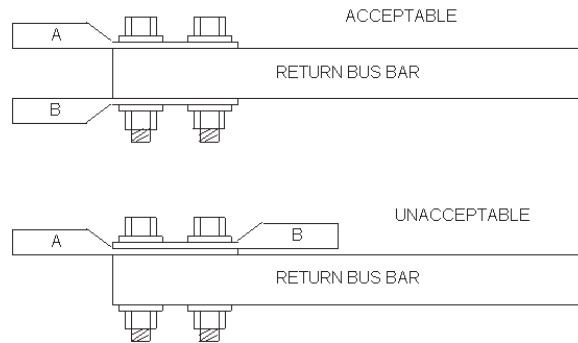


Figure 7 - Bus Bar Diagram

4.7 Supplying and Testing Input Power



WARNING

DO NOT SUPPLY POWER to the HCPDAP until it is securely mounted and grounded!
Before supplying input power, verify that the HCPDAP has no circuit breakers installed! This measure prevents power from reaching any output path.

1. At the BDFB fuse/breaker board, insert the properly rated fuse or breaker for the circuit that feeds the HCPDAP.

NOTE: The maximum allowable fuse or breaker rating is 250 amps.

2. Carefully remove the plastic terminal block covers from the input power terminals.
3. Verify your voltmeter's lead designations and DC range setting so that they correspond to the plant operating voltage.
4. With the voltmeter, measure the HCPDAP Input A and Input B voltages for proper polarity, as shown.
5. Carefully reinstall the terminal block covers.

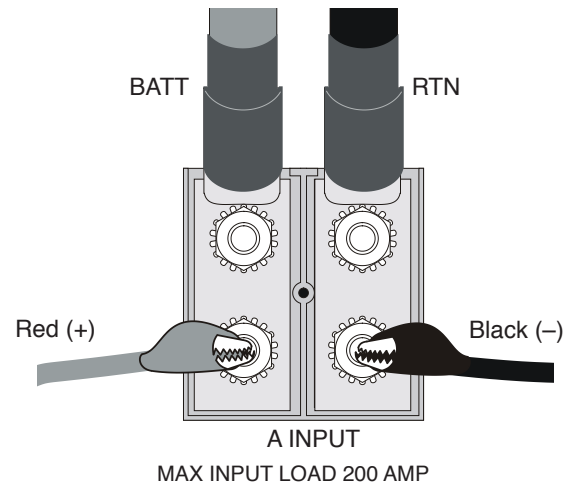


Figure 8 - Test Input Polarity

If plant polarity is:	Voltmeter reads:
-48V	-52V to -54V (typical), or plant operating voltage
±24V	±26V to ±27.5V (typical), or plant operating voltage

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4.8 Testing the Input Power Alarms Relays

It is recommended that you test the Power Alarm relay with an ohmmeter before installing any further cabling. The alarm relays are located on the HCPDAP backplane. They are labeled according to their unpowered state.

Use the table and diagram below as a test guide.

When both A and B input power is ON...	
Place the ohmmeter probes here:	Ohmmeter reads:
Black probe: C Red probe: NC	0 ohm
Black probe: C Red probe: NO	OPEN or OL (open load)

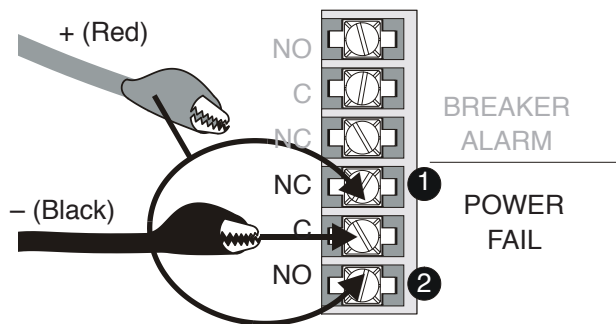


Figure 9 - Test Power Alarm Relays

Input power for...		Relay closure status is...	Visual indicator (Power LED) is...	
Input A	Input B		Power A	Power B
ON	ON	C-NC	ON (GREEN)	ON (GREEN)
ON	OFF	C-NO	ON (GREEN)	OFF
OFF	ON	C-NO	OFF	ON (GREEN)
OFF	OFF	C-NO	OFF	OFF

To test the Breaker Alarm relay at this time, see “5.6 Testing the Breaker Alarm Relays” on Page 21.

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NOTE: To easily cable this device, connect to the output BATT terminal before you connect to the RTN terminal.

5. Secure a RTN cable to the output RTN terminal with the 10–32 KEPS nuts, as shown. Torque the nuts to 20 in-lb (2.27 N•m) with a 3/8–inch (10 mm) socket.
6. Attach the other ends of these cables to the corresponding BATT and RTN terminals of the equipment to be powered by the HCPDAP. Secure the cables according to the equipment manuals or to the operating company's standard installation procedures.
7. Repeat Steps 3 through 6 for each circuit, for both Side A and for Side B.
8. Reinstall the plastic terminal block covers.
9. Use designation labels to record output equipment connections A–1 through A–6 and B–1 through B–6 according to the operating company's standard installation procedures.

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5. Installing Breakers

5.1 General Guidelines for Installing Breakers

Operating companies have guidelines to determine proper circuit breaker ratings. Telect recommends you follow those guidelines where applicable.

Also follow the guidelines below when installing circuit breakers in the High Current Power Distribution Alarm Panel (HCPDAP). These practices prevent injury to personnel, ensure proper distribution panel operation, and prevent damage to the distribution panel and connected equipment.

- Install all output cabling and verify output cable polarities before permanently activating breakers.
- Always select a properly rated breaker for the circuit. Refer to your job specifications for maximum output load ratings and corresponding circuit breaker ratings, or see “5.3 Calculating Circuit Breaker Ratings” on Page 20.



CAUTION

The maximum rated load current for each circuit breaker position must not exceed 100 amps.

The combined current for each output branch circuit (total A output or total B output) must not exceed 200 amps per side.

- Keep cover plates over all vacant breaker positions at all times during installation.
- Review the HCPDAP's power requirements and corresponding cable gauges any time the you add or remove equipment from the panel. This practice confirms proper breaker ratings for the modified circuits, and it ensures that the panel load capacity is not exceeded.
- Read the installation guide provided with the circuit breaker.
- When using high-current breakers, try to leave at least one empty breaker position between breakers.

5.2 HCPDAP Circuit Breaker Capacity

The HCPDAP maximum circuit breaker capacity is 200 amps per side (A and B) for a total of 400 amps. Do not exceed a rating of 100 amps for any breaker position in the panel.

The sum of the circuit breaker ratings on either side (A or B) of the HCPDAP must not exceed that side's maximum rated input current.

Example:

If A and B input current is rated at 200 amps, then the sum of the panel's circuit breaker ratings must be less than or equal to 200 amps:

$$A-1 + A-2 + \dots + A-6 \leq 200 \text{ amps}$$

$$B-1 + B-2 + \dots + B-6 \leq 200 \text{ amps}$$

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5.3 Calculating Circuit Breaker Ratings

Refer to your job specifications for equipment maximum output load ratings and corresponding circuit breaker ratings. Use the following procedure to calculate the equipment's recommended minimum and maximum circuit breaker rating:

1. Determine the maximum output load rating of the equipment in the circuit.
2. Multiply the maximum output load rating by a factor of 1.25 to determine a minimum breaker rating.
3. Multiply the maximum output load rating by a factor of 1.5 to determine a maximum breaker rating.

Example:

If the equipment's maximum output load rating is 20 amps, determine the minimum and maximum breaker ratings for the circuit:

$20 \text{ amps} \times 1.25 = 25 \text{ amps}$ (lower limit)

$20 \text{ amps} \times 1.5 = 30 \text{ amps}$ (upper limit)

NOTES:

- Do not exceed a rating of 100 amps for any breaker position in the panel.
- Due to load current demand variances within the plant operating voltage range, Telect recommends that equipment continuous output load during normal operation should not exceed 80% of the circuit breaker's rated value.

5.4 Installing Circuit Breakers



CAUTION

Do not install circuit breakers under equipment load. Doing so may damage breakers.

1. Unscrew the cover plate from the distribution panel's intended breaker position.
2. Confirm that the breaker is in the "OFF" position.
3. Inspect the breaker for any abnormalities and for proper alarm contact pin alignment. Remove any oxidation and debris from the breaker's contact surfaces.
4. Screw the cover plate to the circuit breaker.
5. Properly align the breaker to the slot in the distribution panel, and firmly push the breaker into position, as shown

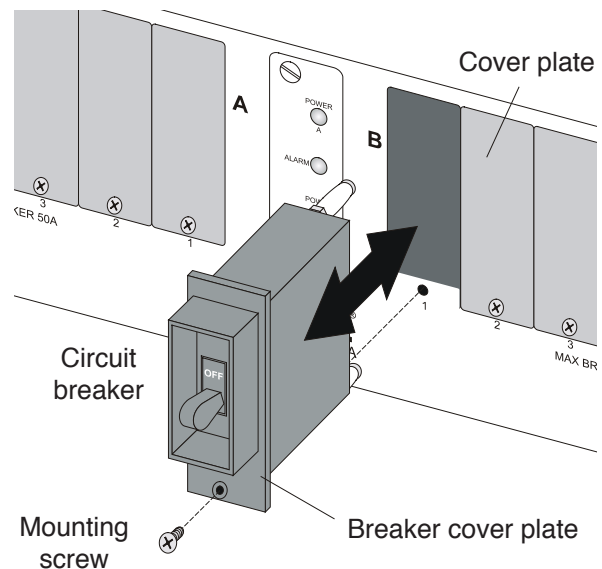


Figure 11 - Installing the circuit breaker

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- Secure the breaker to the front of the panel with the mounting screw.
- Perform a cable polarity test on the circuit.
- Repeat Steps 1 through 7 for each remaining circuit.

5.5 Testing HCPDAP Output Circuit Polarity

Test the polarity of each HCPDAP output circuit. Test only one circuit at a time.

- Verify that input power is ON.
- Switch the circuit breaker to the “ON” position.



CAUTION

The circuit is now live.

- With a voltmeter, test the equipment polarity by probing the equipment’s input power terminal, as shown.
- Shut down power to the circuit by returning the breaker to the “OFF” position. If the cable polarities are reversed, correct the circuit cabling at this time.
- One at a time, repeat Steps 1–3 for each HCPDAP output circuit.
- Confirm that all of the circuit breakers are in the “OFF” position, then replace the plastic terminal block covers.

5.6 Testing the Breaker Alarm Relays

The following tests verify that the HCPDAP Breaker Alarm relay is functioning properly. The alarm relays are located on the HCPDAP backplane. They are labeled according to their unpowered state. The Breaker Alarm relay is unpowered during normal operation.

Use the table and diagram below as a test guide.



CAUTION

Never use fault current to test circuit breakers or the breaker alarm system! Doing so can cause hazardous conditions, equipment damage, or equipment service interruptions.

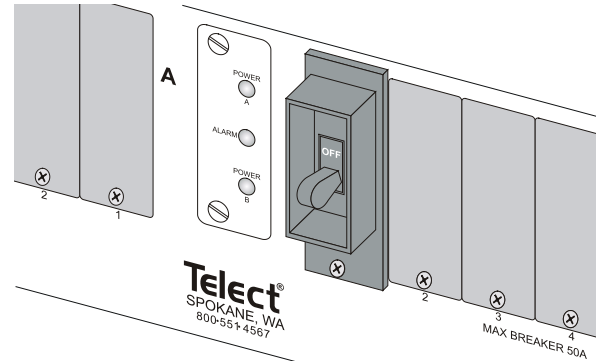


Figure 12 - Securing the circuit breaker

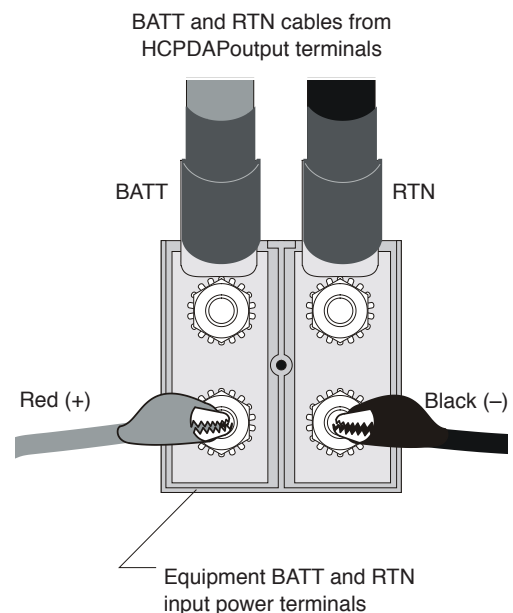


Figure 13 - Test Equipment Polarity

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5.6.1 Breaker Alarm Relay Test

1. Verify that one input power source is ON.
2. On the same input side of the HCPDAP, manually turn a circuit breaker to the “OFF” position to establish an alarm condition.

Use an ohmmeter to test the Breaker Alarm relay, as shown in the diagram and the table.

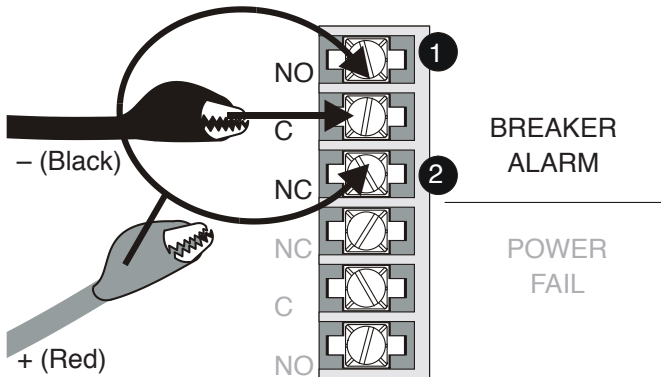


Figure 14 - Test Breaker Alarm Relays

When the circuit breaker is OFF (alarm state)...		When the circuit breaker is ON (normal state)...	
Place the ohmmeter probes here:	Ohmmeter reads:	Place the ohmmeter probes here:	Ohmmeter reads:
Black probe: C Red probe: NO	CLOSED	Black probe: C Red probe: NO	OPEN or OL (open load)
Black probe: C Red probe: NC	OPEN or OL (open load)	Black probe: C Red probe: NC	CLOSED

5.6.2. Breaker Alarm Visual Indicator Test

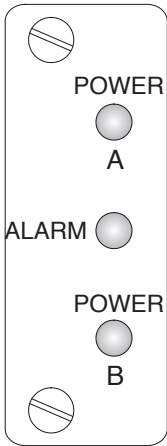
Observe the HCPDAP’s alarm card while performing the following test for breaker alarm visual indicators:

1. Switch the circuit breaker to the “ON” position. The alarm card’s Alarm LED is off.
2. Switch the circuit breaker to the “OFF” position. The alarm card’s Alarm LED is on (RED).
3. Return the breaker to the “OFF” position.

If the Alarm LED does not illuminate:

- a. Verify that the breaker is in the “OFF” position.
- b. Replace the alarm card. See “6.2 Replacing the Alarm Card” on Page 6-1.

When the circuit breaker is...	Relay closure status is...	Visual indicator (Alarm LED) is...
OFF	C–NO	ON (RED)
ON	C–NC	OFF



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5.7 Connecting and Testing External Alarms

This section applies to alarm systems that require a ground for activation. Follow this procedure to connect the HCPDAP alarm relays to the central office alarm system.

To determine which hook-up wire size to use, refer to the operating company's installation procedures; or use 18–22 AWG standard telecom hook-up wire.

1. Follow the operating company's installation procedures when designating, connecting, labeling, and recording alarm circuits.
2. Connect the Power Fail alarm relay leads to the external alarm leads, as shown in the diagram and the table below.
3. Connect the Breaker Alarm relay leads to the external alarm leads, as shown.

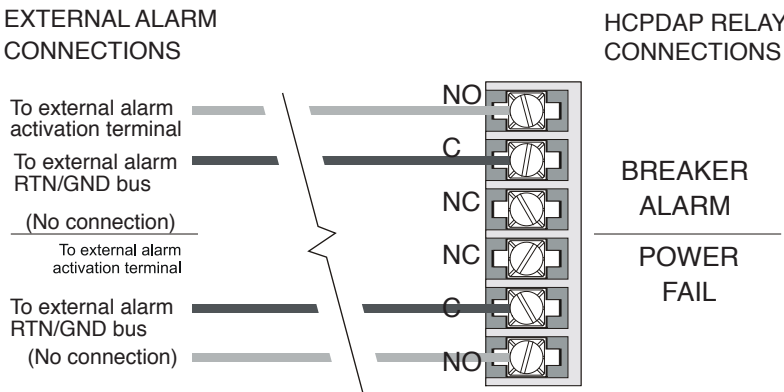


Figure 15 - Alarm leads

Power Fail Alarm		Breaker Alarm	
Connect relay terminal...	To external alarm receiver...	Connect relay terminal...	To external alarm receiver...
NC	Do not connect	NC	Do not connect
C	Common terminal or alarm RTN/ground bus	C	Common terminal or alarm RTN/ground bus
NO	Alarm activation terminal	NO	Alarm activation terminal

4. Switch an HCPDAP circuit breaker to the “OFF” position to test the external Breaker Alarm connection. See “5.6 Testing the Breaker Alarm Relays” on page 3.

NOTE: If the external alarm boards are equipped with a reset function, reset the boards after each test.

5. TURN OFF input power to the HCPDAP to test the external Power Alarm connection. See “4.8 Testing the Input Power Alarm Relays” on Page 4-6.
6. Restore input power to the HCPDAP.

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5.8 Labeling the Distribution Panel

If required, use cable tags to label output cables. At each end of the cable, indicate the opposite end's termination point and the cable polarity. To assist service personnel, fill in the breaker designation card, shown here. Include:

- Rack location
- Breaker position and corresponding equipment location
- Breaker rating
- Equipment output load rating

Post the breaker designation card near the distribution panel.

RACK/BAY#				RACK/BAY#			
FUSE TYPE				FUSE TYPE			
POS	FUSE AMP	LOAD AMP	LOCATION	POS	FUSE AMP	LOAD AMP	LOCATION

Figure 16 - Breaker Designation Card

5.9 Powering the Load Equipment

If you are required to test the functionality of the rack system, power up each circuit according to the following procedure:

NOTE: Begin with the first circuit of the High Current Power Distribution Panel's output side A. Test only one circuit at a time.

1. Activate the circuit's equipment or equipment-shelf cards.
2. At the High Current Power Distribution Panel, switch this circuit's breaker to the "ON" position.
3. Verify that power indicators light up on the cards and equipment. If they do not, troubleshoot the voltage and polarity with a voltmeter, and correct the problem.
4. Watch for abnormalities such as arcing or smoking.

Should this occur, shut down the equipment immediately by switching the circuit breaker to the "OFF" position. Then, troubleshoot the voltage and polarity with a voltmeter, and correct the problem.

5. Repeat Steps 1 through 4 for each circuit—one circuit at a time—for the remaining circuits of output Side A, and then for output Side B.

Upon completion of this process, the system is live and ready for operation.

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6. Operation

6.1 Alarm Conditions and Responses

LED	Status	Meaning	What to do
POWER A	ON (GREEN)	Side A is receiving input power	Nothing—normal operating condition.
	OFF	Input power to the panel's A side has been interrupted.	Examine all cable connections, fuses, breakers, and switches at this panel and at the original DC power supply. Correct any problems and restore power.
POWER B	ON (GREEN)	Side B is receiving input power	Nothing—normal operating condition.
	OFF	Input power to the panel's B side has been interrupted.	Examine all cable connections, fuses, breakers, and switches at this panel and at the original DC power supply. Correct any problems and restore power.
ALARM	ON (RED)	A output circuit breaker has tripped, or turned OFF, on either side of the panel.	Before resetting the breaker, examine the equipment being powered and all cabling to the equipment. Correct as needed and reset the breaker.
	OFF	All panel breakers are closed or "ON."	Nothing—normal operating condition.

6.2 Replacing the Alarm Card

1. Use a No. 1 Phillips screwdriver to loosen the alarm card's two captive screws.
2. Pull the alarm card straight out of the panel.
3. Align the replacement alarm card to the opening on the face of the panel.
4. Slide the alarm card straight into the opening, so that the card's edges are positioned in the PCB guides.
5. Push until the card's connector is firmly seated. The alarm card's front panel should sit against the face of the distribution panel.
6. Use a No. 1 Phillips screwdriver to secure the card's captive screws just beyond finger-tightness.
7. If desired, test the alarm card according to the alarm testing procedures in sections "5.6 Testing the Breaker Alarm Relays" on Page 21 and "4.8 Testing the Input Power Alarm Relays" on Page 15. Telect alarm cards are factory-tested. Replacement testing may not be advisable if it effects office system service.

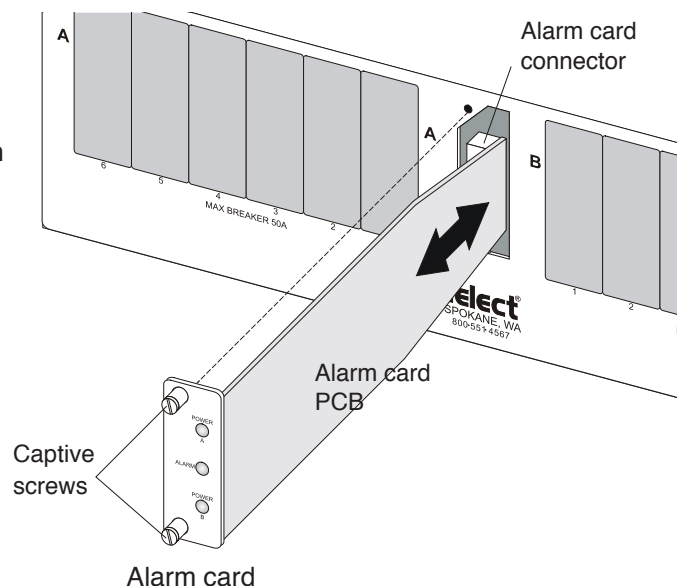


Figure 17 - Alarm card

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6.3 Resetting Breakers

Breakers are designed for a long service life. If a breaker trips to the “OFF” position, do the following:

1. Troubleshoot and correct the problem that caused the breaker to trip. If necessary, remove and replace any equipment or equipment cards.
2. Reset the breaker by switching it to the “ON” position.

6.4 Replacing Circuit Breakers

6.4.1 Power Considerations

Review the following points before installing or replacing circuit breakers into the HCPDAP:

- The panel's input current is limited to 200 amps per side (Input A and Input B), or 400 amps total.
- The panel's total output current per side (Output A or Output B) is limited to 200 amps.
- Each of the panel's twelve circuit breaker positions allow a maximum breaker rating of 100 amps.

6.4.2 Circuit Breaker Replacement Guidelines

- Always select a properly rated breaker for the circuit. Refer to your job specifications for maximum output load ratings and corresponding circuit breaker ratings, or see “5.3 Calculating Circuit Breaker Ratings” on page 20.
- Read the installation guide provided with the circuit breaker.
- When using high-current breakers, try to leave at least one empty breaker position between breakers.
- Keep cover plates over all vacant circuit breaker positions at all times during installation.
- Replace circuit breakers with the exact same breaker size, type, and rating.
- In cases of nuisance tripping, it may be necessary to install a breaker with an increased time delay during the powering of some equipment.
- If you increase a circuit breaker rating, verify that the corresponding output cables are of the proper gauge.

6.5 Replacing Breakers



CAUTION

This procedure is performed when this equipment is powered!

Failure to follow this procedure may damage equipment or cause equipment service interruptions.

1. Follow the operating company's standard procedures for notifying the alarm center.
2. Place a warning tag on the equipment that says, in effect, “Warning: Service Personnel Working on Equipment.”

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3. Verify that the breaker to be removed is in the “OFF” position.
4. Remove the breaker’s mounting screw.
5. Pull or gently pry the breaker from the panel.
6. Install a cover plate over the vacancy during servicing.

NOTE: If you are permanently removing a breaker, always install a cover plate over the vacant breaker position, and secure the cover plate with a mounting screw.

7. Inspect the replacement breaker. Verify that it is of the correct physical type, size, and rating for the panel position. Look for abnormalities and for proper alarm contact pin alignment. Remove any oxidation and debris from the contact surfaces.
8. Screw the breaker cover plate to the circuit breaker.
9. Make sure the breaker is in the “OFF” position.
10. Align the breaker to the slot in the panel and firmly push it into position, as shown.
11. Secure the breaker to the front of the panel with the mounting screw.
12. Switch the breaker to the “ON” position.
13. Verify that power is reaching the output equipment, and that the breaker does not trip immediately.
14. Record the breaker replacement in the appropriate log.

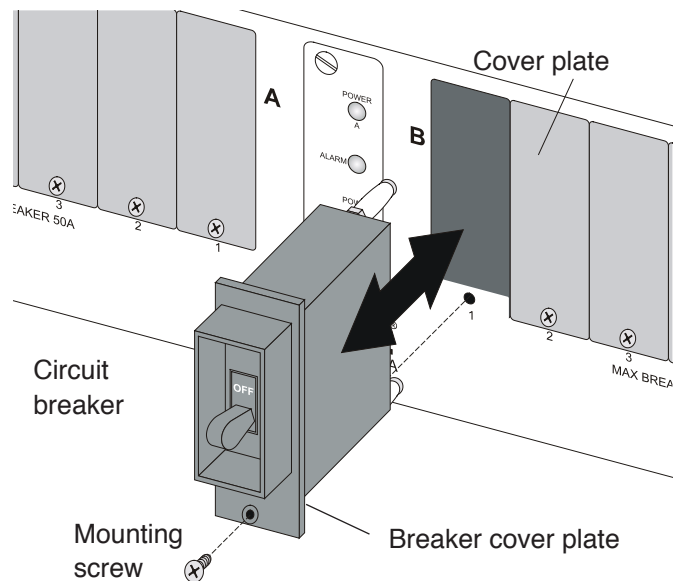


Figure 18 - Installing the Circuit Breaker

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7. Service

7.1 Owner Maintenance

Telect's High-Current Fuse Panel does not require preventive maintenance.

7.2 In-Warranty Service

For assistance with installation, component identification, or missing parts, call Telect: 509-926-6000. An application engineer will help you. Telect will repair or replace defective products. See "Repacking for Shipping" in this section.

NOTE: Call Telect for a Return Material Authorization (RMA) before returning any equipment.

7.3 Out-of-Warranty Service

The procedure for out-of-warranty service is the same as for in-warranty service, except that Telect charges a processing fee, and you must submit a purchase order along with a Return Material Authorization (RMA) before returning equipment. Call Telect at 1-509-926-6000 for help getting these forms.

The processing fee guarantees a repair estimate and is credited against actual material and labor costs.

7.4 Repacking for Shipment

1. Tag the equipment showing owner's name, address, and telephone number, together with a detailed description of the problem.
2. Use the original shipping container if possible. If you do not have it, package the equipment in a way to prevent shipping damage. Include the RMA inside the container.
3. Insure the package.

NOTE: Telect is not liable for shipping damage.

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8. Accessories

Item	Description	Part Number
Alarm card	Standard	400223
Face plate	Circuit breaker face plate	090-0001-0002
Face plate blank	Replacement face plate blank	090-0001-0003
Circuit breakers:	10 amp long delay	090-0052-0010
	20 amp long delay	090-0052-0020
	30 amp long delay	090-0052-0030
	40 amp long delay	090-0052-0040
	50 amp long delay	090-0052-0050
	60 amp long delay	090-0052-0060
	70 amp long delay	090-0052-0070
	80 amp long delay	090-0052-0080
	90 amp long delay	090-0052-0090
	100 amp long delay	090-0052-0100
Ground and input terminal compression lugs:	1/0 AWG or #1 Weld Wire	116108
	2/0 AWG or 1/0 Weld Wire	116109
	3/0 AWG or 2/0 Weld Wire	116110
Output terminal compression lugs:	2 AWG	114552
	4 AWG	110516
	6 AWG	101686

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